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# Geoengineered sulfate aerosol - micropysical evolution depending on emission parameters

Ulrike Niemeier, Hauke Schmidt, and Claudia Timmreck
Max Planck Institute for Meteorology, Atmosphere in the Earth System, Hamburg, Germany (ulrike.niemeier@zmaw.de)

In recent years, several methods have been suggested for "geoengineering" the climate to limit global temperature increase. One of these geoengineering techniques follows the natural example of volcanic eruptions, emitting large amounts of sulfur dioxide ($SO_2$) into the stratosphere. Chemical and microphysical reactions cause the formation of sulfate aerosols, which reduces the incoming solar radiation.

Recently, several studies on this topic have been performed but only one so far (Heckendorn et al. 2009) included an aerosol microphysical model. This leaves the sulfate particle size and the related radiative forcing open for a wide range of assumptions. In our study we aim to clarify the relation between $SO_2$ emissions and the evolution of sulfate aerosol. We used the middle atmosphere general circulation model MAECHAM5 including the global aerosol module HAM. HAM calculates the aerosol microphysics of sulfate and other species and their source and sink processes. The model setup has been validated for the Mt.Pinatubo eruption, showing good agreement with satellite data. We performed a set of geoengineering scenarios with different emission strengths and heights of $SO_2$ injection. The results show a dependency of the microphysical parameters, like particle radius, surface area density and in particular of the radiative forcing of the geoengineered aerosol on the prescribed emission scenarios.